

Written Testimony of  
William J. Craig, President  
National States Geographic Information Council

United States House of Representatives Agriculture Committee  
Subcommittee on Department Operations, Oversight, Nutrition, and Forestry

Hearing on  
The Status of Information Technology at USDA  
March 10, 2010

Chairman Baca, Ranking Member King and members of the Subcommittee, I thank you for the opportunity to testify about the status of information technology at the U.S. Department of Agriculture (USDA). My comments today are limited to the National Agriculture Imagery Program (NAIP), which is operated by the Farm Services Agency (FSA). The NAIP program supports the administration of USDA's various farm programs and NAIP imagery is provided to Federal, state, local and tribal government agencies, educational and scientific institutions, and private sector parties across the country at nominal cost.

I'm here in my capacity as President of the National States Geographic Information Council (NSGIC), but I'm also the Associate Director at the Center for Urban & Regional Affairs at the University of Minnesota. In both capacities, I see the tremendous value of NAIP aerial photography for state and local governments (See list of uses starting on Page 5) and I want to relate the importance of this program to the members of the Subcommittee.

In 2004, NSGIC introduced a concept called Imagery for the Nation (IFTN) which is still being studied by a Federal multi-agency committee. There are two components to this proposed



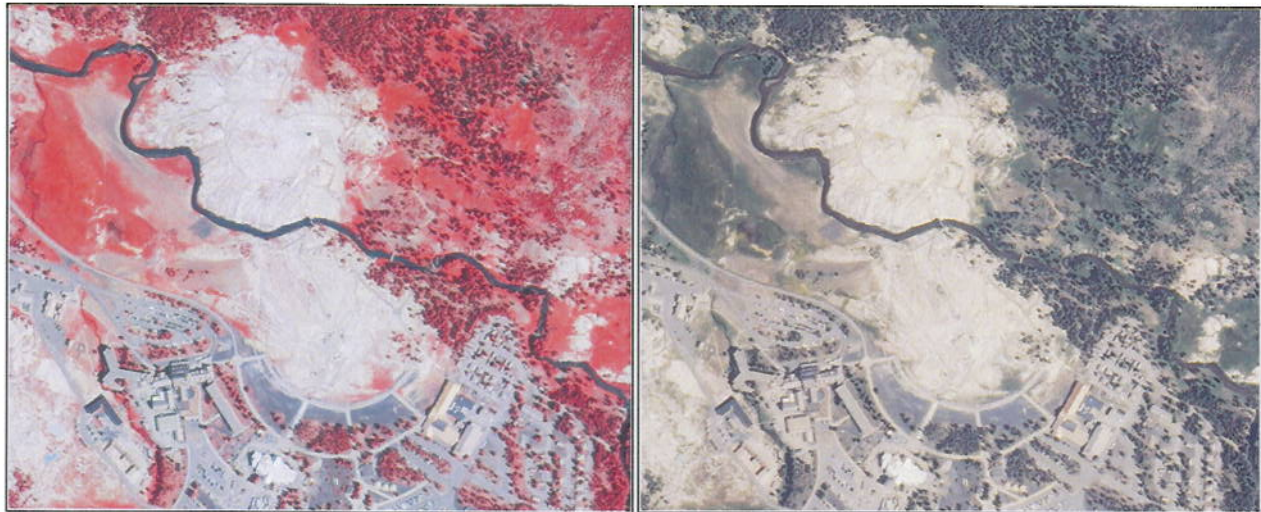
initiative. One is the existing USDA NAIP program which includes high resolution imagery (1-meter resolution) that is collected during the growing season. NAIP imagery is generally most valuable for natural resource and agricultural applications (e.g. identifying timber

**Figure 1 - Comparison of a very high resolution leaf-off image (left) with a NAIP high resolution image (right) to show that leaf-off imagery is used to identify features below the tree canopy. Both image types meet specific business needs.**



resources and developing management plans for farms). The other component of IFTN is a very high resolution imagery program (1-foot resolution) that is collected during leaf-off periods. This type of imagery has great value to all communities for mapping applications, since you can “see” through significant areas of vegetation to identify features on the ground (e.g. see the red circles in the images above that show houses and roads to the left that don’t appear under tree cover in the forested areas to the right). Both types of imagery are complimentary and both are critical to meet the varied needs of all government programs.

Five years after the introduction of IFTN as a concept, we are very pleased with the continuous improvements made to the NAIP program. Secretary Vilsack and the staff of the Farm Services Agency should be commended for their commitment to this program. I have previously referred to NAIP as a “happy accident,” meaning that it was a Federal program that just happened to align with some of the business requirements of state and local governments. In the past few years, however, USDA has turned a happy accident into an intentionally productive partnership. They understand the inherent value of this program to all levels of government, the agricultural community and the general public (e.g. as a base image in Google Earth™). FSA diligently works to improve its products and to account for the business requirements of its stakeholders. NAIP program managers have worked very hard to meet the vision of IFTN while functioning within the constraints of their mission and budget. It is truly refreshing to see this level of commitment and dedication.



**Figure 2 - The Old Faithful geyser located in Yellowstone National Park. Using modern digital cameras, one image can be acquired to produce color infrared imagery (left) and natural color imagery (right). Each type of imagery meets specific business needs.**

One key element of Imagery for

the Nation is the opportunity to “buy up,” that is the ability of users like state and local governments to pay an extra amount to obtain improvements in the basic NAIP images tailored to meet their own business requirements. They work with USDA through cooperative agreements and pay the full cost of modifying the base imagery to meet their own requirements (e.g. image type, accuracy and acquisition date). The examples shown above compare natural color and color infrared imagery as one example of a possible buy-up option.



Each type of imagery allows the user to interpret and understand different things about the condition of the land. Color infrared (CIR) imagery can be acquired at a slightly higher cost than the base product and the requesting party pays all additional costs. CIR allows for accurate interpretation of forest type and identification of wetlands among other uses. Again, USDA has been willing to work with state and local governments to incorporate their requirements into its contracts to help reduce duplication of effort and government waste. By working through the contracts administered by USDA, states are able to significantly reduce their own costs. This is because large area contracting reduces the per square mile costs for acquiring and processing imagery. This translates into smarter, more efficient and cost-effective government. Imagery acquired on an annual basis can help monitor the conversion of agricultural land, urban growth, general land cover changes and construction activities. Imagery also helps to document progress on major construction projects such as those being funded through the American Reinvestment and Recovery Act.

Over the eight years since the inception of NAIP in 2002, state and local partners have contributed \$10 million to the program, or about 7 percent of its total cost. It is estimated that at least twice this amount was leveraged in additional work outside the FSA contractual arrangement. These state monies are a prime example of state, local and tribal entities cost-sharing with a federal program. Both the states and USDA have benefitted from the additional coverage and products resulting from these arrangements. At the same time, NAIP imagery is being used as the imagery layer for The National Map program operated by the US Geological Survey. The State of Idaho partnered with NAIP in 2009 to acquire the statewide imagery shown at right. They invested \$269,000 which was matched by \$758,000 contributed by Federal and other partners. This allowed Idaho to become a full partner in the acquisition and buy-up the product to 4-band digital imagery which is capable of supporting many types of analyses and producing a variety of image types similar to the Yellowstone Park example above.



Figure 3 - 2009 NAIP 4-Band image of Idaho

I would be negligent, if I didn't discuss the importance of this program to the private sector companies that perform the image acquisition and processing work. They have enormous investments in research and development, aircraft, equipment, facilities and IT infrastructure. The business generated by the NAIP program is responsible for maintaining hundreds of high-tech jobs within the photogrammetric industry and related support jobs throughout the



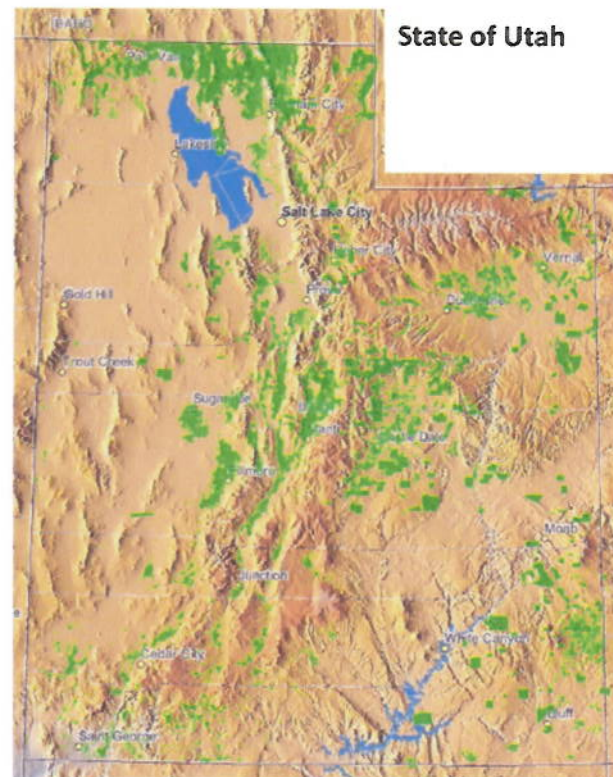
country (e.g. aircraft mechanics and hotel staff). Given the current economy, the positive impact of this program can't be overstated and it will help these companies survive until our economy is once again solvent and growing.

Now, I would like to get to the point of this discussion. I'm asking you, on behalf of the Board of Directors and state government members of NSGIC, for legislation that will provide a statutory authorization to assure that funding for NAIP is kept separate from salaries and expenses of FSA – a step necessary to keep the program stable and predictable. I'm also asking you to fund the NAIP program at a level adequate to support annual 1-meter image acquisition over the Continental U.S. (CONUS), 1-meter imagery every five years over Alaska, and 1-meter imagery every three years over Hawaii and the insular areas – a total cost estimated at about \$55 million per year. NAIP funding has previously been limited to CONUS, but these other areas are also critical to the economy and security of the nation. They are either not served, or are severely underserved by government imagery programs. NSGIC is absolutely confident that FSA staff can manage a comprehensive 1-meter program for the entire nation and we urge you to give them this responsibility.

Full funding (including new funds) is important for this program because the principal mission of NAIP is to acquire imagery over the common land units (CLU) which are basically farm locations. In many states this represents a small portion of the state, but there are many other related agricultural issues (e.g. forestry and water resources management) in other areas that are subject to numerous government programs. One example of this can be clearly seen in the map of Utah at right where the green areas represent the extent of the CLUs.

NSGIC does not have detailed information on the breakout of costs that will be required to accomplish this work, but I'm certain that FSA could make this information available for review by the Subcommittee.

My final thoughts turn to the countless uses for NAIP imagery. I have included a partial list that was compiled by NSGIC members. In many cases, these applications can also be satisfied by other types of imagery. Others are only partially satisfied by NAIP due to the characteristics of the imagery, but regardless of any issues, this is an impressive list that demonstrates the usefulness of this program. Having a dependable program with annual refresh cycles will increase the number of uses for NAIP.



**Figure 4 - Map of Utah showing the location of Common Land Units (agricultural areas) in green**

## Typical Uses for NAIP Orthoimagery

(Partial list for illustration purposes)

### Fire and Emergency Services

- ☒ Locating roads, buildings and infrastructure in wildland fire prone areas and during other events that require protection or evacuation (i.e. hazardous materials release)
- ☒ Mitigate and plan for wildfire losses (i.e. Firewise Program)
- ☒ Determine staging areas for large incidents
- ☒ Determine ingress and egress points during incidents
- ☒ Provide to mutual aid companies to assist their orientation to the area
- ☒ Locating snowmobile, ski and ATV trails for wireless 911 rescues
- ☒ Aid in search and rescue operations and for finding landing sites in wilderness areas for helicopters

### Law Enforcement and Homeland Security

- ☒ Use during incidents and preplan for containing escaped offenders from crime scenes and at correctional facilities
- ☒ Determine ingress and egress points when serving warrants and during incidents
- ☒ Determine staging areas for back-up and special operations units
- ☒ Identify weaknesses in border security
- ☒ Depict critical infrastructure features and their location to populated areas
- ☒ Use for crime scene analysis, trends and pattern recognition

### Emergency Management

- ☒ Evacuation route planning
- ☒ Floodplain mapping
- ☒ Flooding analysis and mitigation activities
- ☒ Emergency management analysis and planning
- ☒ Identify, monitor, assess and map the effects of wildland fires, wind storms, ice storms, landslides, avalanches, tornados, hurricanes, flooding and other disasters
- ☒ Identify, map and plan for the security of critical infrastructure
- ☒ Use in command posts to brief and inform senior managers
- ☒ Identify existing structures in danger due to natural or man-made disasters

### Transportation

- ☒ Use for alternative route analysis and planning
- ☒ Assist in the design and engineering requirements for bridge and culvert projects
- ☒ Assist in establishing rural route addressing
- ☒ Display, analyze and map road accident locations

### Natural Resources & Environmental Management

- ☒ Identify, delineate and map wetlands
- ☒ Develop land and timber management plans
- ☒ Identify, analyze and map wildlife habitats
- ☒ Support soil erosion assessments
- ☒ Support drainage studies
- ☒ Identify and map surface waters, streams and shorelines
- ☒ Identify, map and analyze watersheds
- ☒ Identify, map and maintain trails (snowmobile, ski, ATV, Horse & Hiking)
- ☒ Use for hunting and fishing activities
- ☒ Reduce the number of field visits made by permit staff
- ☒ Help identify and notify property owners affected by permit decisions
- ☒ Monitor natural and man-made changes in the landscape (i.e. encroachment on wetlands)



- ☒ Quantify the impacts of sea-level rise and climate change
- ☒ Assist in carbon sequestration studies
- ☒ Assist in monitoring and regulation of permit violations (e.g. floodplain and wetland fills, and expansion of mining facilities)
- ☒ Identify and map forest fragmentation

#### Geological Studies

- ☒ Soil mapping
- ☒ Geologic mapping
- ☒ Groundwater analysis and mapping
- ☒ Identify and map geologic hazard areas
- ☒ Identify and map land subsidence and ground fissures due to groundwater extraction
- ☒ Identify, analyze and map geothermal and mineral resources
- ☒ Use for oil and gas exploration and development

#### Agriculture

- ☒ Compliance and crop monitoring
- ☒ Agricultural land delineations
- ☒ Monitoring the spread and eradication of invasive species
- ☒ Determine need for and plan spraying programs (e.g. Mosquito and Gypsy Moth abatement)
- ☒ Plan re-vegetation programs
- ☒ Determine the health of forests, grazing and multiple use areas
- ☒ Use for farmstead activities (e.g. routing driveways, and locating new feedlots and buildings)
- ☒ Use in precision agriculture to assure maximum economic return to farmers while reducing environmental problems associated with over-fertilization
- ☒ Use in developing conservation plans, nutrient management plans, tile drainage plans, wind break plans, and manure management plans
- ☒ Identify grazing issues and rangeland health

#### Education

- ☒ Bus Routing Decisions
- ☒ Help students learn more about their world
- ☒ Help teach students about geography

#### Planning

- ☒ Use during comprehensive plan development
- ☒ Assist site development and redevelopment activities
- ☒ Determine and map land use
- ☒ Assist zoning decisions
- ☒ Detect changes in land cover over time (e.g. conversion of agricultural lands, forestry operations and urban sprawl)
- ☒ Help relate planning decisions to the public

#### Assessments and Taxation

- ☒ Assist in property assessments
- ☒ Locate new and/or unauthorized building activities
- ☒ Defend assessments during Board of Review hearings

#### Public Health

- ☒ Identify and map groundwater recharge areas and well head protection zones
- ☒ Inventory potential sources of groundwater contamination
- ☒ Identify and map known superfund locations and other sources of contamination
- ☒ Identify and map air pollution sources (i.e. factory smoke stacks)

- ☒ Provide inputs for and develop modeling programs
- ☒ Identify and map disease habitats and disturbed areas (e.g. Hantavirus, Chronic Wasting Disease and Lyme Disease)
- ☒ Identify and map failing septic systems

#### Economic Development

- ☒ Identify areas of interest for recreation and tourism
- ☒ Use for real estate acquisition decisions and to show properties to customers in relation to the landscape
- ☒ Identify areas for Federal land disposal and land swaps
- ☒ Plan for construction and use to monitor oil and gas pipelines, and electric transmission lines
- ☒ Assist preliminary site planning and construction for general construction projects

#### Other Uses

- ☒ Use during public meetings and hearings to help citizens relate to public programs and development activities
- ☒ Inventory public infrastructure to comply with GASBY 34/35
- ☒ Manage public utilities in compliance with EPA rules
- ☒ Identify and map every aspect of the Earth's surface and manmade structures
- ☒ Use as historic records of man's activities
- ☒ Use to locate survey monuments and to plan surveying activities
- ☒ Monitor water "rustling"
- ☒ Inventory, analyze and map open space for wind, solar, and other alternative energies
- ☒ Backdrop for interactive web-mapping sites
- ☒ Providing on-demand printed aerial "Maps" for the public (e.g. hunters, land owners, real estate developers, and hiking)
- ☒ Selecting sites for communications towers
- ☒ Help provide location information to a more geographically aware public (e.g. public meetings, news broadcasts, and commercial mapping sites like Google Earth<sup>™</sup> and Mapquest<sup>™</sup>)

**Committee on Agriculture  
U.S. House of Representatives  
Information Required From Nongovernmental Witnesses**

House rules require non-governmental witnesses to provide their resume or biographical sketch prior to testifying. If you do not have a resume sketch available, please complete this form.

1. **Name:** William J. (Will) Craig
2. **Business Address:** Center for Urban & Regional Affairs  
University of Minnesota  
301 – 19<sup>th</sup> Avenue South, #330  
Minneapolis MN 55455
3. **Business Phone Number:** 612-625-3321
4. **Organization you represent:** National States Geographic Information Council
5. **Please list and special training, education, or professional experience you have which add to your qualifications to provide testimony before the Committee:**
  - PhD in Geography, University of Minnesota, 1980
  - Pioneer in GIS (Geographic Information Systems) as project director and systems director of the Minnesota Land Management Information System, one of the first GIS in the world.
  - Work closely with state, county, and local governments as part of the University of Minnesota's mission of public engagement.
  - Co-founder of the University of Minnesota's Master of Geographic Science program, the first professional masters GIS degrees in the nation.
  - Past president of URISA (Urban and Regional Information Systems Association) and of UCGIS (University Consortium for Geographic Information Science).
  - 2009 inductee into *URISA's GIS Hall of Fame*.
  - Author of the *GIS Code of Ethics* and numerous publications on public use of GIS.
  - Member of the Mapping Science Committee, National Academy of Sciences (2000-2005) and a member of the study committee for *National Land Parcel Data: A Vision for the Future*.
6. **If you are appearing on behalf of an organization, please list the capacity in which you are representing that organization, including any offices or elected positions you hold:**
  - President (2009-10) and Board Member (2005-2011) of NSGIC
  - Member (1992-2009), Chair (1993) and Vice Chair (1995-2009) of the Minnesota Governor's Council on Geographic Information – a member organization of NSGIC. (Now reconstituted as the Statewide Geospatial Advisory Council.)

**PLEASE ATTACH THIS FORM OR YOUR BIOGRAPHY TO EACH COPY OF TESTIMONY.**



Committee on Agriculture  
U.S. House of Representatives  
Required Witness Disclosure Form

House Rules\* require nongovernmental witnesses to disclose the amount and source of Federal grants received since October 1, 2006.

Name: William J. Craig

Address: 301 – 19<sup>th</sup> Avenue South, Suite 330, Minneapolis MN 55455

Telephone: 612-625-3311

Organization you represent (if any): National States Geographic Information Council

1. Please list any federal grants or contracts (including subgrants and subcontracts) you have received since October 1, 2006, as well as the source and the amount of each grant or contract. House Rules do **NOT** require disclosure of federal payments to individuals, such as Social Security or Medicare benefits, farm program payments, or assistance to agricultural producers:

Source: None Amount:

2. If you are appearing on behalf of an organization, please list any federal grants or contracts (including subgrants and subcontracts) the organization has received since October 1, 2006, as well as the source and the amount of each grant or contract:

Source: Department of Homeland Security Amount: \$665,486.64

Source: Department of Interior Amount: \$324,886.28

Source: Department of Commerce Amount: \$51,585

Please check here if this form is NOT applicable to you:

Signature: William J. Craig

\* Rule XI, clause 2(g)(4) of the U.S. House of Representatives provides: Each committee shall, to the greatest extent practicable, require witnesses who appear before it to submit in advance written statements of proposed testimony and to limit their initial presentations to the committee to brief summaries thereof. In the case of a witness appearing in a nongovernmental capacity, a written statement of proposed testimony shall include a curriculum vitae and a disclosure of the amount and source (by agency and program) of each Federal grant (or subgrant thereof) or contract (or subcontract thereof) received during the current fiscal year or either of the two previous fiscal years by the witness or by any entity represented by the witness.

PLEASE ATTACH DISCLOSURE FORM TO EACH COPY OF TESTIMONY